

HEC40D Decoder Controller User and Installation Manual

Model HEC40D



HEC40D Version 6.11.1

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TABLE OF CONTENTS	PAGE
Selecting the Location for the Controller	3
Mounting the Controller	3
Mains Connection	3
Two Core Cable	4
Cable Earth Points	4
Installing Decoders	6
Setting Decoder Serial Number	6
Pump Start	6
Pump Pressurisation	6
Set Number of Valves	7
Re-Set Controller	7
Programming Instructions	
Set Current Time	7
Set Today	7
Set Valve Water Time	8
Set All Valve Run Times	8
Configuration for Two Valves on at Same Time	9
Set Two Valves to operate at same time	9
Set Days of the Week Cycle Starts	10
Set Daily Cycle Start Times & Odd / Even Watering	10
Set Required Number of Programs	7
Operating the Controller Manually	
Manual Station Advance	11
Manual Stop - Terminating a Watering Cycle	11
Manually Turning a Station On and Off	11
Manually Turning Master Valve/Pump On and Off	11
Manual Activating a Station for its Programmed Time	11
Manual Activating a Program	11
System Check Cycle (see manually activating a program)	11
Rain Off	12
Water Budgeting	12
Options	14
Fault Reporting	12 / 13
Display output Current	7
Stop Input	6
Two Wire Cable Sizing	15
Pump Start Relays / Master Valve Decoders	16

SELECTING THE PROPER LOCATION FOR YOUR CONTROLLER

Indoor Wall Mount

If possible, always select an indoor location for your controller where you are assured of maximum protection from environmental hazards, accidents, and vandalism. Mount the controller on a solid, smooth surface shoulder high so the operator can easily see the display and read the faceplate graphics.

Outdoor Wall Mount

The most desirable location is shoulder high on the shady side of a suitable wall. Avoid concealing the controller behind a shrub or near ground level where it will be in the direct path of a sprinkler head. Do not mount the controller in direct sunlight. Do not mount the controller where ambient temperatures above 40°C are present.

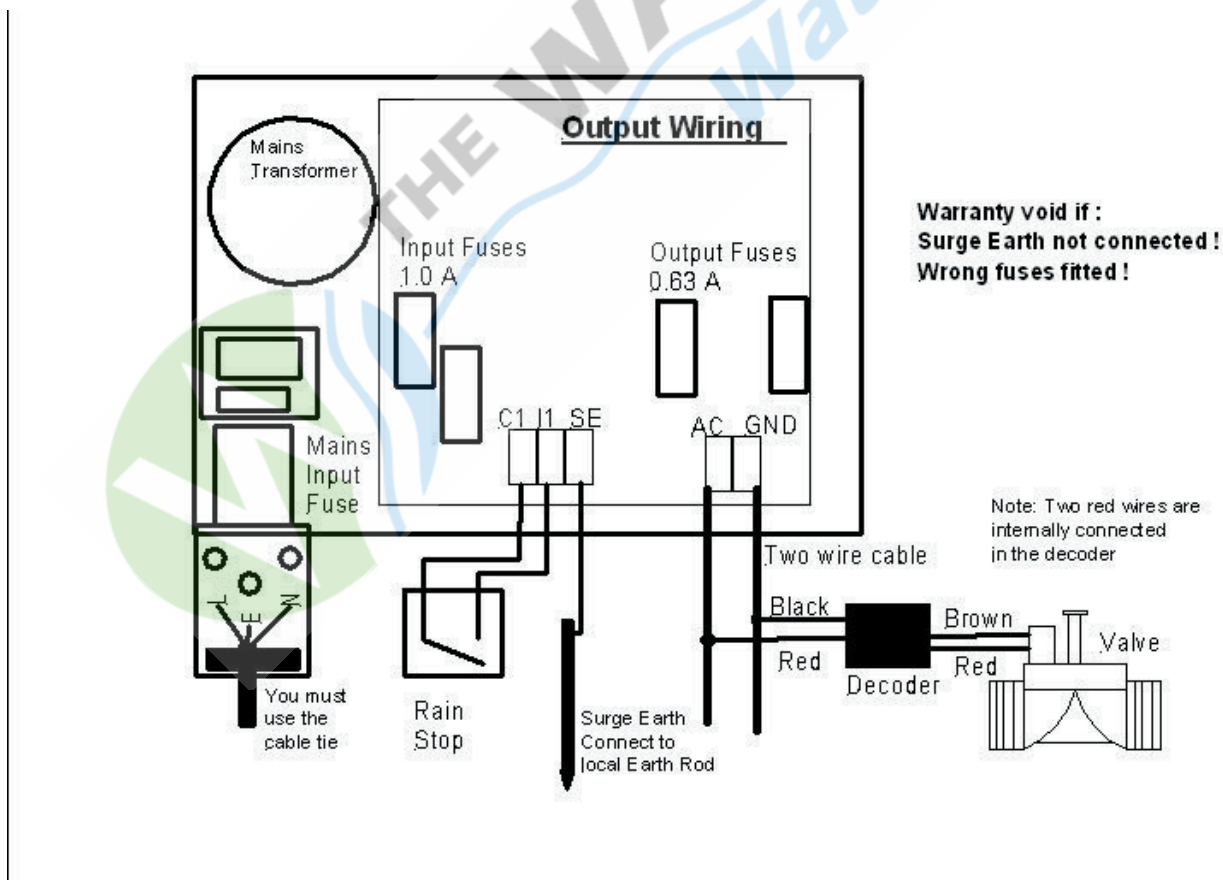
MOUNTING THE CONTROLLER

Wall Mount

Select suitable fasteners such as molly bolts in plaster board, wood screws in wood, etc. Check to see that the head of the screw will pass through the lid bolt hole. Controller should be mounted using four screws, one screw through each corner lid bolt hole. **Warning additional holes should not be drilled through controller casing.**

CONNECTING MAINS SUPPLY (Licenseced Electrician)

Important Make sure mains supply is turned off before connecting the controller. Check that the mains supply voltage is 240vac same as controller input voltage. The mains supply should be fused with a 3 amp fuse and connected via a residual Current Circuit Breaker. Connect the mains supply to the three terminals inside the IEC plug Live to L, Neutral to N and Earth to E as shown in Fig 1.



IMPORTANT YOU MUST CONNECT SURGE EARTH

TWO CORE CABLE PATH OUTPUT

One two-wire cable output rated at 0.6A at 28VAC. The two-core cable output is protected by an electronic fuse, which is set at 0.6A. The controller gives out 28VAC to power 24VAC solenoids. This larger voltage allows for voltage drop in the two wire cable. If you are connecting solenoids close to the controller (less than 200m) there will be little voltage drop and you should check that the solenoids are capable of withstanding a voltage as high as 28VAC.

TWO CORE CABLE PATH

No special two wire cable is required. No restriction on the topology of the two wire cable. When solenoid valves are located at some distance from a controller there will be a voltage drop in the cable. Care must be taken to ensure that the maximum cable run will not create excessive voltage drop to prevent the solenoid valve from working. A maximum of 40 single station decoders can be connected to the two-wire cable. When installing a looped path do not run cable back to output terminal. Join cable at ground level below controller, see Fig 2 page 5.

The maximum cable run is dependent upon

The size of the cable

The number of valves operating together

The current draw of the solenoid valve and its minimum working voltage

Fluctuations in mains voltage and loading on the controller transformer.

The number of decoders

For guidance purposes we will assume that

the solenoid valve takes 0.25A and is operating on its own

the minimum operating voltage is 20V

there are 40 decoders on the cable that are evenly distributed

The following table shows the maximum distance that a valve can operate using a single cable run and a looped cable run for different size cable. **Important** please consult HR Products when running multiple solenoids and longer cable paths are required.

Cable Size	Distance to furthest valve on a single path	Distance to furthest valve on loop circuit
1.0mm ²	0.64 klm	1.28 klm
1.5mm ²	0.96 klm	1.92 klm
2.5mm ²	1.6 klm	3.2 klm

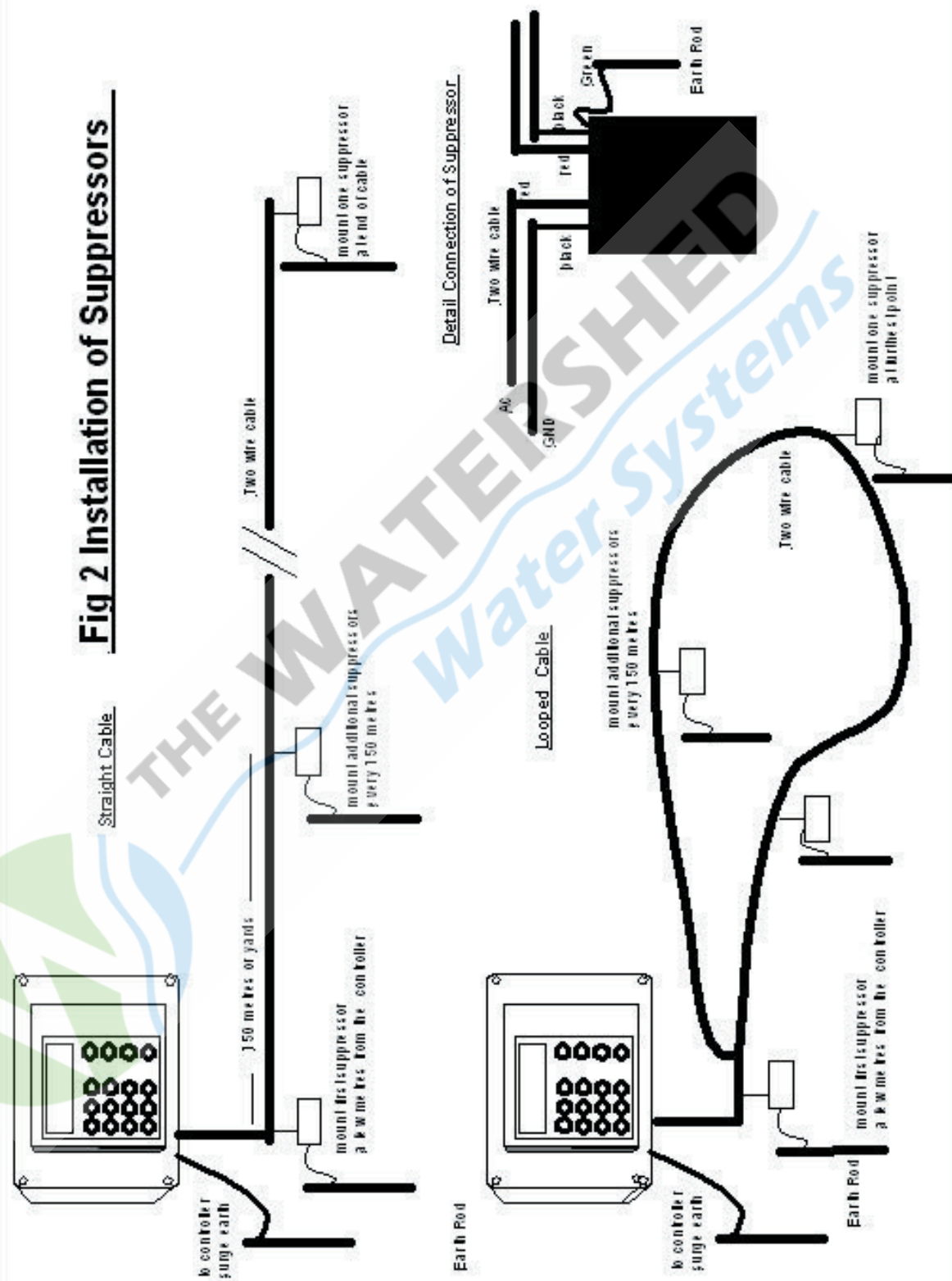
See page 15 for calculating voltage drop

CABLE EARTH POINTS

Heron cable earth points (CSUPE) should be wired to the two wire path with copper earth rods.

A minimum of three CSUPE should be installed for any looped cable path and a minimum of two for straight cable path. Additional cable earth points should be wired every 750 m if necessary. Failure to wire these earth points will make the controller liable to serious damage caused by lightning surges. See Fig 2 page 5

Fig 2 Installation of Suppressors



INSTALLING DECODERS

Never expose decoders to direct sunlight or in locations where they may be exposed to ambient temperatures of more than 38°C. In warmer climates this will necessitate installing in valve box underground. It is recommended that a two wire water proof cable joiner eg. 3M DBY or similar, is used to connect the decoders. All cable joints must be sealed to minimise water ingress.

The controller gives out 28VAC to power 24VAC solenoids. This larger voltage allows for voltage drop in the two wire cable. If you are connecting solenoids close to the controller (less than 200m) there will be little voltage drop and you should check that the solenoids are capable of withstanding a voltage as high as 28VAC. **IMPORTANT use decoder model HECD1. Decoder is available with 1 output at a load of 0.6A Decoder outputs are**

Yellow = 24vac solenoid (color may vary)

Red = 24vac solenoid

Black = two wire path (black)

Red = two wire path (red)

SETTING DECODER SERIAL NUMBERS

You need to set the decoder serial number of each irrigation valve. The decoder serial number is shown on the side of each decoder. Any decoder serial number can be assigned to any valve. For example, if you have a decoder with serial number 02345 and you wish this to be valve 1 you must assign 02345 to valve 1. Proceed as follows: Press RIGHT arrow key until the following page is displayed EDIT S/N. Press SELECT and the following page will be displayed EDIT S/N 001 VALVE 1 02345. Now using the keyboard enter the required serial number for valve 1, example 02345. Press RIGHT arrow key to enter serial numbers of other valves. To return to the time page press START STOP key twice.

PUMP START

The HEC40D does not have a pump start output. To facilitate a pump start output you must purchase a Heron Two Wire Pump Start. There are a number of options available. **Important Never connect any relay across the two wire cable. See page 18 for Pump Start options.**

PUMP PRESSURISATION IN SECONDS (Option 6)

The pump pressurisation time (in seconds) can be set, make sure the VALVES OFF is displayed by pushing START STOP key twice. Press and hold MANUAL ADVANCE key for five seconds waiting for the option screen to appear. Once option screen is displayed, using the RIGHT arrow key scroll to option 6, using the key pad change delay time between 1 second to 99 seconds. Press UP ARROW key to display time screen.

STOP INPUT

One Stop input. An open contact on the input will stop the irrigation program for the duration of the closed contact. Cable lengths on this input should be kept to less than 20 meters. The remote stop input is across "I1" and "C2" (See Fig 1 page 3). Watering will continue when the contact closes. When the remote Stop Input is active the following message will be displayed. **STOP** indicates that a sensor connected to the remote stop input has been activated.

SET CURRENT TIME & DAY

Make sure the VALVES OFF is displayed by pushing START STOP key twice.
Press and hold down on 0 key for five seconds or until flashing cursor appears.
Using the number keys and RIGHT arrow key, the correct time of day can be entered.
When you have set the time press START STOP key twice.

SET TODAY

Make sure the VALVES OFF is displayed by pushing START STOP key twice.
Press and hold down on 0 key for five seconds or until flashing cursor appears.
Using the RIGHT arrow key scroll across to current DAY, push select key to set correct day.
Press START / STOP to remove flashing cursor

SET NUMBER OF VALVES (Option 1)

Make sure the VALVES OFF is displayed by pushing START STOP key twice.
Press and hold MANUAL ADVANCE key for five seconds waiting for the option screen to appear.
Once option screen is displayed, using the RIGHT arrow key scroll to option 1, the default valve number is 20 using the key pad change to your required number of valves. A maximum of 40 valves can be set.
Press UP ARROW key to display time screen.

SET REQUIRED NUMBER OF PROGRAMS (Option 4)

Make sure the VALVES OFF is displayed by pushing START STOP key twice.
Press and hold MANUAL ADVANCE key for five seconds waiting for the option screen to appear.
Once option screen is displayed, using the RIGHT arrow key scroll to option 4 and now key in your desired number of programs between 1 and 16. Press UP ARROW key to display time screen.

RE-SET CONTROLLER (Option 14)

All irrigation programs and automatic starts can be re-set back to 0. Make sure the VALVES OFF is displayed by pushing START STOP key twice. Press and hold MANUAL ADVANCE key for five seconds waiting for the option screen to appear. Once option screen is displayed, using the RIGHT arrow key scroll to option 14 and press 99. Press UP ARROW key to display time screen.

DISPLAYING OUTPUT CURRENT (Option 5)

Make sure the VALVES OFF screen is displayed by pushing START STOP key twice.
Press and hold MANUAL ADVANCE key for five seconds waiting for the option screen to appear.
Once option screen is displayed using the RIGHT arrow key scroll to option 5 and press 1.
Press UP ARROW key to display time page. The controller has now been set to display output current.
Press the RIGHT arrow key the following extra page will be displayed.

EXTRA INFO
CURRENT = 180mA

With one solenoid valve operating you would expect about 200mA (0.2A) to be flowing, two valves operating would expect 400mA (0.4A)

SET VALVE RUN TIMES

Make sure the VALVES OFF is displayed by pushing START STOP key twice.

Press the RIGHT arrow key to display EDIT PROG 1, to select other programs use the key pad to enter your chosen program between 1 & 15 now press SELECT and the display will change to display below.

The cursor will be flashing on VALVE 01 time. **IMPORTANT** run times can be set from 1 min to 9 hours.

VALVE 01	00.00
VALVE 02	00.00
VALVE 03	00.00
VALVE 04	00.00

Now you want VALVE 01 to run for 10 minutes & VALVE 02 to run for 5 minutes, use the key pad to enter 10 minutes for VALVE 01 press the RIGHT arrow key to scroll down to VALVE 02 and enter 5 minutes. Repeat this for all remaining valves.

VALVE 01	0:10
VALVE 02	0:05
VALVE 03	00.00
VALVE 04	00.00

When finished press START / STOP twice to display time page.

SET ALL STATION RUN TIMES

When setting up an irrigation program, the 'Set All' key is a quick method of setting a number of valves to the same time. Press the RIGHT arrow key to display EDIT PROG 1 (cursor will be flashing on 1) if you want to set another program select any number between 1 & 16, press SELECT then press SET ALL.

The cursor will be flashing on 1 press the RIGHT arrow key to move cursor, use the key pad to select your last valve number, press the RIGHT arrow key to drop down to valve water time. Use key pad to enter your chosen water time. Press SET ALL to accept your run time. Press START / STOP key twice to display time page.



CONFIGURATION FOR TWO VALVES ON AT SAME TIME (Option 8)

Make sure the VALVES OFF is displayed by pushing START STOP key twice.

Press and hold MANUAL ADVANCE key for five seconds waiting for the option screen to appear.

Once option screen is displayed using the RIGHT arrow key scroll to option 8 and press 1.

Press UP ARROW key to display time page. The controller has now been configured to allow a maximum of 2 valves on at same time.

SET TWO VALVES ON AT SAME TIME (Option 7)

Make sure the VALVES OFF is displayed by pushing START STOP key twice.

Press and hold MANUAL ADVANCE key for five seconds waiting for the option screen to appear.

Once option screen is displayed using the RIGHT arrow key scroll to option 7 and press 1.

Press the UP ARROW arrow key to display time page. The controller can be set to allow a maximum of 2 valves on at same time.

In the example below, there are four valves displayed VALVE 01 , VALVE 02 VALVE 03 and VALVE 04. Press the RIGHT arrow key to display EDIT PROG 1 (cursor will be flashing on one) if you want to set another program select any number between 1 & 16, press SELECT your program will now be similar to the following.

A	VALVE 01	09.00
B	VALVE 02	05.00
A	VALVE 03	00.00
B	VALVE 04	00.00

If you want the first 2 valves to run together and the next 2 valves to run together press the RIGHT arrow key to scroll to B at valve 02 press SELECT to change to A. Now scroll to A at valve 03 press SELECT to change to B. Your program will now be similar to the following.

A	VALVE 01	09.00
A	VALVE 02	05.00
B	VALVE 03	00.00
B	VALVE 04	00.00

When this program runs it will run all the valves marked with an 'A' until it reaches valves marked with 'B'. So in the above program it will run VALVE 01 and VALVE 02 together. The program will then run VALVE 03 and VALVE 04 for the set water time etc. The program will not move onto the next group until all valves have run the set water time. In the above example VALVE 03 and VALVE 04 will not run until VALVE 02 has finished.

Important: Ensure that your program never has a consecutive string of more than 2 'A's or 2 'B's as the controller will not run the program. If more than two valves are set controller will display CONFIG FAULT PRG 1 on time page.

IMPORTANT to prevent unwanted valve changes set Option 8 to 0 when finished programming.

SET CYCLE START TIMES

HEC40D controller operates a 14 day clock, this allows odd or even day watering, upto 32 daily cycle starts can be set. Controller has 3 daily cycle starts per program set from factory. For more cycle starts see setting DAILY CYCLE STARTS.

SETTING DAYS OF THE WEEK FOR CYCLE STARTS

Make sure the VALVES OFF is displayed by pushing START STOP key twice.

Press RIGHT arrow key to display the EDIT AUTOS page, press SELECT to display the daily start screen.

AUT START 1			
OFF	MON	AT	0.00

Cursor will be flashing on PROG 1 press SELECT key to change from Prog 1 up to Prog 16.

Press RIGHT arrow key to scroll to MON, press select to change to your required water day.

Press RIGHT arrow key to scroll to time and using key pad enter your desired start time.

AUT START 1			
PRG1	MON	AT	6.00

To enter a second start time, press the RIGHT arrow key to display AUT START 2, and repeat the process for selected days and cycle start times.

SETTING DAILY CYCLE STARTS & ODD / EVEN WATERING (Option 3)

Controller has 3 daily cycle starts set from factory, Up to 32 cycle starts can be selected, cycle starts can be set to any given day ie: all 32 cycle starts can be allocated to one day or a series of days of the week by choice. Make sure the VALVES OFF is displayed by pushing START STOP key twice.

Press and hold MANUAL ADVANCE key for five seconds waiting for the option screen to appear.

Once option screen is displayed using the RIGHT arrow key scroll to option 3 and press 1 - 32, press

RETURN key to display time screen. Press RIGHT arrow key to display the EDIT AUTOS page, press

SELECT key until DAILY is displayed. For ODD / EVEN watering press select key to choose between

ODD / EVEN watering days.

AUT START 1			
PRG1	DAILY	AT	6.00

Screen shows first daily cycle starts, press SELECT key to change from program 1 up to 15.

Use key pad to set the first cycle start time, press the RIGHT arrow key to scroll to 2 cycle start, use key

pad to set your second cycle start time, repeat this process for a 3rd cycle start etc. A maximum number of

32 daily or weekly cycle starts can be set by changing Option 3. (see above)

OPERATING CONTROLLER MANUALLY

To manually start the pump, a valve or an irrigation program press START STOP and the following page will be displayed.

START	PUMP	VALVE
	PROG	

PUMP START

Press START STOP key, with the flashing arrow pointing at PUMP press SELECT to start PUMP. The display below will be shown.

TIME	12:30
	PUMP ON

VALVE START

Press START STOP key, press the RIGHT arrow key to position the flashing arrow to point at VALVE. Press SELECT and the page below is shown.

START	
VALVE 1	MINS 2

Enter the number of the valve to be started. Press the RIGHT arrow key and then enter the number of minutes the valve is to run. In the example above valve 1 has been set to run for 2 minutes. Now press SELECT to start this valve. The TIME PAGE will be displayed as shown below.

TIME 16:04	DAY 2	TUE
MAN VALVE	0:58	

PROGRAM START

Press START STOP key, to start an irrigation program press the RIGHT arrow key to move to PROG. Press SELECT to start the irrigation program. Enter any program 1 to 16 press SELECT to start the irrigation program. The time page will be displayed as shown below.

TIME 16:05	DAY 2	TUE
PROG 1	VALVE 01	9:59

MANUAL STOP

Pressing START STOP at any time when a program, valve or pump is running will stop the program, valve or pump immediately.

MANUAL ADVANCE

With irrigation program running press MANUAL ADVANCE to move to next station in the sequence.

RAIN OFF (Option 13)

Make sure the VALVES OFF is displayed by pushing START STOP key twice.

Press and hold MANUAL ADVANCE key for five seconds waiting for the option screen to appear.

Once option screen is displayed using the RIGHT arrow key scroll to option 13 and press 1.

Press UP ARROW key to display time screen. The controller has been set to allow automatic starts to be disabled by pressing the SELECT key when on the Time page. When automatic starts are active the controller will display the following

TIME	12:00	MON
	AUTOS ON	

When the SELECT key is pressed the controller will then display the following and all automatic starts will be disabled until the SELECT key is pressed again.

TIME	12:00	MON
	AUTOS OFF	

WATER BUDGETING (Option 11)

Make sure the VALVES OFF screen is displayed by pushing START STOP key twice.

Press and hold MANUAL ADVANCE key for five seconds waiting for the option screen to appear.

Once option screen is displayed using the RIGHT arrow key scroll to option 11 and press 1.

Press RETURN key to display time screen. The controller has now been set to allow percentage water time adjustments from 1% to 250% for automatic programs. Press the RIGHT arrow key until the following screen is displayed.

Use the key pad to make percentage changes from 1% to 250%

MAN ADJUST
50%

In the example above irrigation programs will run for half their normal time.

Important do not leave the percentage value at 0%. No irrigation will run.

FAULTS

If a fault occurs whilst the controller is running a watering program, for example a cable breaks, then the following display is shown.

TIME 12:11
FAULT

The nature of the fault is displayed by pressing RIGHT arrow key. The Fault Page will be displayed.

FAULT
N12 DECO

In the example above the Fault Page indicates that a decoder fault has occurred.

IMPORTANT: To find the appropriate decoder serial number and/or valve name from the Valve Reference Number go to EDIT SERIAL numbers screen (see page 6)

(see page 13 for fault report details)

Display	Fault	Response	Action
CAB O/L1	two wire cable line loading not ok	all irrigation programs will be stopped	Find short on cable by cutting the cable at determined distance or using a clamp meter
CAB O/L2	remote short on two wire cable (between 0.63amps and 1.5amps being drawn)	all irrigation programs will be stopped	Find short on cable by cutting the cable at determined distance or using a clamp meter
CAB O/L3	Direct short on two wire cable (more than 1.5amps being drawn)	all irrigation programs will be stopped	Find short on cable by cutting the cable at determined distance or using a clamp meter
CAB O/L4	Current overload when valves running (between 0.63 amps and 1.5amps being drawn)	Current and subsequent irrigation programmes will continue. If 10 faults occur all programs will be stopped	Run the program and see what valve or valves are running when the problem occurs. It is likely to be a coil short circuit on the output of a decoder or too many valves operating together. You can also set Option 5 to display the current.
CAB O/L5	Direct short when valves running (more than 1.5amps being drawn)	current and subsequent irrigation programmes will continue. If 10 faults occur all programs will stop	Run the program and see what valve or valves are running when the problem occurs. It is likely to be a coil short circuit on the output of a decoder or too many valves operating together. You can also set Option 5 to display the current..
Nx DECO x=valve reference number	no acknowledgement from the decoder when switching on	current and subsequent irrigation programmes will continue. If 10 faults occur all programs will be stopped	Find the decoder with the valve reference number. Check decoder serial is correct. Check decoder is connected correctly. Try decoder locally at controller
Nx OFF x=valve reference number	no acknowledgement from decoder when switching off	program will be stopped and then restarted	find the decoder with the valve reference number. Retry the decoder twice to see if problem repeats. Check joints to decoder. If decoder still fails test at controller.

Clearing Fault Conditions ,the fault page is cleared by manually starting and stopping an irrigation program.

OPTIONS

Heron controller is supplied with 10 user Options. Throughout this User Guide you would have been setting these as you entered certain irrigation requirements. This section describes the options you can set on your controller. To access the configuration options press and hold down MANUAL ADVANCE button for 10 seconds. The following page will be displayed.

OPTION		
1	2	3
8	3	0

The LEFT and RIGHT arrow keys are used to position the cursor under the option you want to change. Use the keypad to enter the required number, as described below, to activate the option.

In the example above, Option's 1,2 and 3 have been set to 8, 3 and 0. When the required options have been set, press the RETURN key

Options are listed below.

Option	Description	Default Value	Allowed Value	See Page
1	Set number of valves	20	1 - 40	7
2	NOT USED			
3	Set number of Weekly automatic starts	3	0 - 32	10
4	The number of irrigation programs	1	1 - 16	7
5	Display current measurement	0	1	7
6	Set pump pressurisation time in seconds	3	0 - 59	6
7	Operating two valves in parallel	0	1	9
8	Configuration for operating two valves in parallel	0	1	9
9	NOT USED			
10	NOT USED			
11	Use Percentage Up and Down	0	1	12
12	NOT USED			
13	Use 'Disable Automatic Starts' facility (Rain off)	0	1	12
14	Reset programs and automatic starts	0	1	7
15	NOT USED			

CALCULATING VOLTAGE DROP

The following assumes the decoder current is negligible. The cable voltage drop is given by the formula
Cable Voltage Drop = $2 \times L \times R \times C$

L is length in Km between the controller and the valve as measured along the length of the cable

R is the resistance per Km

C is the current consumption of the valve (a standard valve will take a current of 0.25A).

Running Multiple Valves from One Output

If you run valves in parallel then you must multiply the valve current by the number of valves you are running in parallel.

Looped Cables

The resistance of a looped cable is halved because the current has two paths to follow. The voltage drop of a looped cable is

$$\text{Cable Voltage Drop} = 0.5 \times L \times R \times C$$

Where the L is measured around the total circumference of the loop.

Approximate Cable Resistance

The table below lists approximate values of cable resistance. Always check the actual resistance of your cable you are installing.

Cable Size	Resistance Per Klm
1.0mm ²	19 ohms
1.5mm ²	13 ohms
2.5mm ²	8 ohms

Example:

If 2.0Km of 2.5mm² cable was used to connect a valve taking 0.25A then voltage drop would be calculated as follows

From table above 2.5mm² cable has resistance of 8 ohms/km.

Therefore Voltage Drop = $2 \times 2.0\text{Km} \times 8 \times 0.25 = 8 \text{ V}$

(Cable Voltage Drop = $2 \times L \times R \times C$)

PUMP STARTS & MASTER VALVE

A range of pump start modules are available. All the pump start modules are controlled via the two-wire cable. All pump start modules can be remote from the controller. A maximum of 100 pump start modules can be fitted.

Type	Features	Output	Isolation between 2 wire cable and pump start control
DIN rail relay (DECBRDIN)	Connected from two wire path, will activate 240vac output when 30vac on cable path	240V contact rated	4mm through relay contact, not recommended for areas with high probability of surge
Optical latching (DECBPL)	Connected from two wire path, will activate 240vac output when 30vac on cable path.	240V contact rated	30mm excellent immunity to electrical surges
Optical Intelligent Pump Start latching (DECBPL2SN)	Connected from two wire path, programmable decoder has ON serial & OFF serial numbers will activate 240vac output. If pump decoder loses 30V then it will switch off	240V contact rated	30mm excellent immunity to electrical surges
Optical 24VAC (DECBP24V)	Optical pump start used in areas with high surges. Used with DECBMV2SN to provide switching signal when 30vac on cable path. Requires transformer (240vac - 24vac) supplied with DECBP24V	24Vac at 0.4amp to contactor of pump.	30mm excellent immunity to electrical surges
Decoder Master Valve (DECBMV)	Connected from two wire path, will activate 24vac solenoid when 30vac on path.	24Vac at 0.6amp	built in surge protection excellent immunity to electrical surges
Programmable Master Valve (DECBMV2SN)	Connected from two wire path, programmable decoder has ON serial & OFF serial numbers will activate 24vac solenoid. Also used with DECBP24V to provide isolation from surges or intelligent pump start.	24Vac at 0.6amp	built in surge protection excellent immunity to electrical surges